What are we going to learn in here?
Math for Standards

Name _____

Date _____

This paper outlines the topics that we will be covering throughout the year. This class is aligned to cover everything on the Pennsylvania State Assessment Anchors.

Numbers and Operations

1. Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers, and number systems:
- Represent and/or use numbers in equivalent forms
- Find the square root of an integer to the nearest tenth using either a calculator or estimation
- Express numbers and/or simplify expressions using scientific notation
- Simplify square roots
- Apply number theory concepts to show relationships between real numbers in problem solving settings
- Find the Greatest Common Factor (GCF) and/or the Least Common Multiple (LCM) for sets of monomials
- Estimate the value of an irrational Number
- Locate/identify irrational numbers at the approximate location on a number line
- Compare and/or order any real numbers

2. Understand the meanings of operations, use operations, and understand how they relate to each other:
- Apply ratio and/or proportion in problem-solving situations
- Solve problems using operations with rational numbers including rates and percents
- Solve problems using direct and inverse proportions
- Identify and/or use proportional relationships in problem solving
- Use exponents, roots, and/or absolute value to solve problems
- Simplify/evaluate expressions involving positive and negative exponents, roots, and/or absolute value
- Simplify/evaluate expressions involving multiplying with exponents

3. Compute accurately and fluently and make reasonable estimates:
- Apply order of operations in computation and in problem-solving situations
- Simplify/evaluate expressions using the order of operations to solve problems
- Use estimation strategies in problem-solving situations

Measurement

1. Apply appropriate techniques, tools, and formulas to determine measurements:
- Use and/or compare measurements of angles
- Measure and/or compare angles in degrees (up to 360 degrees)
- Use and/or develop procedures to determine or describe measures of perimeter, circumference, area, surface area, and/or volume

- Calculate the surface area of prisms, cylinders, cones, pyramids, and/or spheres
- Calculate the volume of prisms, cylinders, cones, pyramids, and/or spheres
- Estimate area, perimeter, or circumference of an irregular figure
- Find the measurement of a missing length given the perimeter, circumference, area, or volume
- Describe how a change in the linear dimension of a figure affects its perimeter, circumference, area, or volume

Geometry

1. Analyze characteristics and properties of two- and three-dimensional geometric shapes and demonstrate understanding of geometric relationships:
    - Identify and/or use the properties of a radius, diameter, and/or tangent of a circle
    - Identify and/or use the properties of arcs, semicircles, inscribed angles, and/or central angles
    - Recognize and/or apply properties of angles, triangles, and quadrilaterals
    - Identify and/or use properties of triangles (medians, altitudes, angle bisectors, side/angle relationships, Triangle Inequality Theorem)
    - Identify and/or use properties of quadrilaterals (parallel sides, diagonals, bisectors, congruent sides/angles, and supplementary angles)
    - Identify and/or use properties of isosceles and equilateral triangles
    - Use properties of congruence, correspondence, and similarity in problem-solving settings involving two- and three-dimensional figures
    - Identify and/or use properties of congruent and similar polygons or solids
    - Solve problems involving right triangles using the Pythagorean Theorem
    - Find the measure of a side of a right triangle using the Pythagorean Theorem
2. Locate points or describe relationships using the coordinate plane:
    - Solve problems using analytic geometry
    - Calculate the distance and/or midpoint between 2 points on a number line or a coordinate plane
    - Relate slope to perpendicularity and/or parallelism

Algebraic Concepts

1. Demonstrate an understanding of patterns, relations, and functions:
    - Analyze and/or use patterns or relations
    - Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically
    - Determine if a relation is a function given a set of points or a graph
    - Identify the domain, range, or inverse of a relation
2. Represent and/or analyze mathematical situations using numbers, symbols, words, tables, and/or graphs:
    - Write, solve, and/or graph linear equations and inequalities using various methods
    - Solve compound inequalities and/or graph their solution sets on a number line
    - Identify or graph functions, linear equations, or linear inequalities on a coordinate plane

- Write, solve, and/or apply a linear equation
- Write and/or solve systems of equations using graphing, substitution, and/or elimination
- Solve quadratic equations using factoring (not including completing the square or quadratic formula)
- Simplify expressions involving polynomials
- Add, subtract, and/or multiply polynomial expressions (in simplest form)
- Factor algebraic expressions, including difference of square and trinomials
- Simplify algebraic fractions

3. Analyze change in various contexts:
   - Describe and/or determine change
   - Identify, describe, and/or use constant or varying rates of change
   - Determine how a change in one variable relates to a change in a second variable
   - Compute and/or use the slope of a line
   - Apply the formula for the slope of a line to solve problems
   - Given the graph of the line, 2 points on the line, or the slope and a point on a line, write or identify the linear equation in point-slope, standard, and/or slope-intercept form
   - Compute the slope and/or y-intercept represented by the linear equation or graph
   - Interpret and/or use linear, quadratic, and/or exponential functions and the equations, graphs, or tables
   - Match the graph of a given function to its table or equation

Data Analysis and Probability

1. Formulate or answer questions that can be addressed with data and/or organize, display, interpret, or analyze data:
   - Appropriately display and/or use data in problem-solving settings
   - Create and/or use appropriate graphical representations of data, including box-and-whisker plots, stem-and-leaf plots, or scatter plots
   - Analyze data and/or answer questions based on displayed data
2. Select and/or use appropriate statistical methods to analyze data:
   - Use measures of central tendency to describe a set of data
   - Calculate or select the appropriate measure of central tendency of a set of data given or represented on a table, line plot, or stem-and-leaf plot
   - Calculate and/or interpret the range, quartiles, and interquartile range of data
   - Describe how outliers affect measures of central tendency
3. Understand and/or apply basic concepts of probability or outcomes:
   - Apply probability and/or odds to practical situations
   - Find the probabilities for independent, dependent, or compound events and represent as a fraction, decimal, or percent
   - Find, convert, and/or compare the probability and/or odds of a simple event
   - Apply counting techniques in problem-solving settings
   - Determine the number of permutations and/or combinations or apply the fundamental counting principle

4. Develop and/or evaluate inferences and predictions or draw conclusions based on data or data displays:

- Make predictions using data displays and probability
- Estimate or calculate to make predictions based on a circle, line, or bar graph, or a given situation
- Use probability to predict outcomes
- Analyze and/or interpret data on a scatter plot and/or use a scatter plot to make predictions
- Draw, find, and/or write an equation for a line of best fit for a scatter plot
- Make predictions using the equations or graphs of best-fit lines of scatter plots

Projects:

There will be a series of projects that you will complete with the time left in the school year following the completion of the PSSA exam. We may or may not complete all of the projects.

The first will be a WebQuest where you will work with a series of virtual manipulatives online to determine different patterns as they appear when working through problems. You will then choose two of the manipulatives to present to the class, where you will be able to be creative with your presentations.

For the second project, you will choose a mathematician to research. You will find out about their life as well as their contributions to the world of mathematics (and anything else interesting about them) and complete a minimum of a two-page essay on your mathematician.

The third project will task you to research a mathematical concept with a partner or two. You will present this project to the class as if you were teaching a lesson on the topic. You will include a lesson, practice problem, and a worksheet that you will pass out and grade. For this project, you will think of yourself as the teacher, and be able to present your material in a way that you would like to see in a classroom.

The fourth project will include a more real-world connection of the mathematics. This project could be done as a class project or in groups. Details for this project will be developed as the year progresses.